

## Claims

### **What is claimed:**

1. A multiphase reactor, comprising a reactor shell, wherein a rotary build-in member comprising a rotator and an annular rotator is installed inside the reactor shell.  
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2. A multiphase reactor according to claim 1, wherein the said reactor shell is in a cylinder shape with a smooth inner surface, or an inner surface waved transversely or longitudinally, and the waved inner surface can be formed by rotating  
10 a curved line or a poly-line.
3. A multiphase reactor according to claim 1, wherein the structure of the said rotary build-in member are as follows: the annular rotator 3 is settled on the reactor shell 1 and formed by rotating a straight line and a curved line round the rotation axis, wherein the straight line is parallel to the rotation axis, and the two ends of the curved line are connected with the two ends of the straight line respectively, and the straight line and the curved line are within same plane; the distance between the straight line and the rotation axis is longer than that between the curved line and the rotation axis; correspondingly, the rotator 2 is mounted on the annular rotator, and  
15 is formed by rotating the curved line round the rotation axis, the curved line's two ends are connected with the two ends of the rotation axis respectively and the curved line and the rotation axis are within same plane; the rotator and the annular rotator are coaxial.  
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- 25 4. A multiphase reactor according to claim 1, wherein the maximum diameter  $\Phi_{DA}$  of the said rotator 2 is not less than the inner diameter of the annular rotator  $\Phi_{DB}$ .

5. A multiphase reactor according to claim 1, wherein the rotary build-in member comprising the rotator 2 and the annular rotator 3 as well as their corresponding shell are integrated together to form a unit; several such units can be mounted in the reactor from the top to the bottom.

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6. A multiphase reactor according to claims 1, 2, 3 or 5, wherein the reactor shell, the rotator and the annular rotator are manufactured separately, then installed as desired by welding, riveting, screwing or bolting; or installed them as a reaction unit in a way of one-shot molding; or the rotator and a corresponding section of the shell 10 are installed together in a way of one-shot molding, and the annular rotator and its corresponding section of the shell are installed together in a way of one-shot molding, then the two parts above-mentioned are connected together into an unit by welding, riveting, screwing, flanged connection, or by bell and spigot joint.

15 7. A multiphase reactor according to claim 5, wherein the units can be connected together in order by welding, riveting, bolting, flanged connection, or by bell and spigot joint.